SU-390

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

OCT 17 1979

All Power Reactor Licensees
All Applicants With Applications for a License

Gentlemen:

This past March, the NRC transmitted to you a copy of Volume 3 of NUREG-0460, "Anticipated Transients Without Scram for Light Water Reactors" (ATWS) and a copy of an NRC letter that was sent this past February to each of the four nuclear reactor vendors. The letters to the vendors contained requests for information needed to perform generic analyses related to ATWS.

As we pointed out in our March letters, the generic analyses we requested were intended to confirm that the modifications proposed by the NRC staff for various classes of LWR designs would in fact accomplish the degree of ATWS prevention and mitigation described by the staff in its report. We also pointed out that we had chosen to work directly with the vendors in obtaining this information in an effort to conserve both NRC and industry resources. We requested that utilities cooperate with the vendors in performing the requested analyses.

Shortly after sending the letters to the vendors, the NRC Staff met with representatives of each of the NSSS vendors and many Utility representatives in Bethesda on March 1, 1979. The meeting was called to discuss the "early verification" approach in which we planned to use generic analyses as the basis for rulemaking. We hoped thereby to avoid costly and unnecessary repetitive analysis for individual plants. At the meeting, a tentative schedule was agreed to for generic analyses for each class of plants to be provided in three separate packages to be submitted May 1, September 1, and December 1, 1979.

MA
4

7912110264

Immediately following the March 1 meeting, the NRC staff met separately with each of the NSSS vendors and agreements were made as to the minimum information to be supplied in the May 1 package. Also, as noted above, copies of the ATWS staff report and the generic analyses questions were transmitted to the Utilities.

On March 28, 1979 the Three Mile Island accident occurred. Because of the heavy expenditure of NRC resources required for Three Mile Island related activities, essentially no staff effort was applied to the ATWS issue for three months or so following the accident. There was also a substantial reduction in effort on the part of the PWR industry during that period, and some reduction for BWRs.

In June, 1979, the NRC Office of Nuclear Reactor Regulation was temporarily reorganized. Within this interim organization a group was assgned under the direction of S. Hanauer to work on the 19 Unresolved Safety Issues as designated by the Commission and reported to Congress this past January in NUREG-0510. ATWS is one of these 19 issues.

A preliminary NRR Staff review suggested that, for PWRs, the Three Mile Island accident raised new questions with regard to the appropriateness and adequacy of the resolution of ATWS as proposed by the Staff in Volume 3 of NUREG-0460. For BWRs, the staff has concluded that the technical impact of Three Mile Island was minimal and that the completion and review of the generic analyses for BWRs as specified in March should proceed as expeditiously as possible.

A meeting was held in Bethesda on July 25, 1979 to discuss, with representatives of PWR utilities and designers, considerations arising from the Three Mile Island accident that might be relevant to ATWS. For your information, a copy of the staff minutes of that meeting is attached as Enclosure 1. As can be seen from the minutes, at the meeting the staff:

a) Reiterated that ATWS is still believed by the staff to be a serious safety concern and that future protection should be provided. We stated that we are unwilling to wait another year to make progress on ATWS.

b) Expressed some general and specific technical concerns raised by the Three Mile Island accident with regard to the ATWS resolution proposed in Volume 3 of NUREG-0460.

c) Asked the industry to provide in writing, within 30 days of the meeting date, its preliminary assessment of the Three Mile Island impact on ATWS, the scope of effort now foreseen to resolve TMI issues, and a realistic schedule for providing the needed ATWS information. This would include both the March request and the TMI-related analyses.

OCT 17 1979

Subsequent to the July 25 meeting, we have met with representatives of the four NSSS vendors and of some Utility/Owners. We have met with GE to discuss the scope of the remaining generic analysis information to be supplied for BWR 4/5/6's. We have also met with representatives of the GE BWR/3 Owners, B&W, B&W ATWS Owners Group, W, W ATWS Owners Group, and CE. At all these meetings, we considered further the required information and the schedule for its submittal.

We have now received letters (see the list in Enclosure 2, attached) from the various groups describing the information to be furnished and projected schedules. On the basis of our review of these letters and meetings with the industry representatives, we perceive that the projected responses in several cases would not address several questions in our February 15 letter. In particular, several items are lacking that we will need to justify acceptance of the hardware approaches of NUREG 0460 Vol 3 rather than using the design basis accident approach.

I am determined to submit a proposed ATWS rule to the Commission for both PWRs and BWRs early in 1980. The type and content of the rule we will propose will depend critically upon the types and content of the information available to the staff. This will, of course, include whatever responses are actually provided by the industry in response to the questions attached to the February 15 staff letter, the March meetings, and the Three Mile Island related concerns as discussed in the July 25 and subsequent meetings.

I still believe that it is possible for the early verification generic analysis program to provide an acceptable resolution of the ATWS issue and that this is the way to achieve resolution with the least possible expenditure of NRC and industry resources. However, I want to reiterate that the success of this approach depends on whether or not all of the information necessary for the staff to confirm that its proposed ATWS modifications provide an acceptable level of protection, for all plants, is provided by the industry.

I strongly encourage you to join or form Utility/Owners Groups, if you have not already done so, and provide the resources necessary to supply the needed technical information pertaining to your plants, either operating or under construction. It would further reduce the impact on the industry as well as the staff resources if the ATWS effort coordination and the review role is performed by one industry group.

If you have additional questions on the generic analysis early verification program discussed in this letter, please contact Mr. Ashok Thadani, (301-492-7341).

Sincerely,

H. R. Denton, Director
Office of Nuclear Reactor Regulation

Enclosures:
1. NRC-Industry ATWS Meeting Summary dtd 7/25/79
2. List of letters from Industry on Content of Report Submittals

ENCLOSURE 1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUL 27 1979

Task Action Plan A-9

MEMORANDUM FOR: S. H. Hanauer

FROM: A. Thadani

SUBJECT: NRC-INDUSTRY ATWS MEETING SUMMARY

The staff met with the PWR vendors, the Atomic Industrial Forum (AIF) and several utility representatives to discuss the impact of TMI-2 events on the ATWS resolution plan described in Volume 3 of NUREG-0460.

The staff made the following initial remarks:

1) ATWS is still a safety concern and protection from these events must be provided. Although plants need not be shutdown immediately because of relatively low likelihood of a severe ATWS in a PWR in the next couple of years, ATWS resolution with suitable speed is necessary to permit an implementation plan which would assure an acceptably low risk from ATWS over the life of nuclear plants.

2) The staff would like to receive industry views on the impact of TMI-2 on ATWS and how to proceed from now on to resolve ATWS. The staff noted that they intend to propose an ATWS solution to the Commission preferably with but if necessary without the industry input.

3) In view of TMI-2 accident, the staff expressed the following general concerns with the Vol. 3 proposed resolution and asked for industry comments.

   a) What assurance do we have that the excessive calculated pressures for some designs modified per Alternative #3 would not result in loss of integrity of reactor coolant pressure boundary. (Note - Some designs may experience peak pressures - 4000 psi).

   b) Would increasing the number of safety valves as per Alternative #4 result in insufficient overall risk reduction? Would the primary system integrity be maintained? Would it be better to have larger capacity valves?

c) In view of questions a and b above, the pressurizer relief and safety valves must be qualified for water relief to assure that the nozzles, the valve body and the support structure integrity will be maintained and to estimate discharge flow rate and the likelihood and effects of valve chatter.

d) In view of significant plant differences in the designs of auxiliary feedwater system, Emergency Core Cooling Systems and other systems, how would the industry provide assurances that plant specific features have been adequately addressed in the "Early Verification" approach for resolving ATWS as described in NUREG-0460, Vol. 3.

e) Other Lessons Learned from TMI-2.

Following preliminary comments from the NRC staff members, G. Sorensen of WPPS who is also the Chairman of the AIF ATWS committee, made the following comments.

1) ATWS is not a safety issue but rather it is a licensing issue which needs resolution.

2) AIF in concert with the industry had reviewed ATWS in light of TMI-2 and had concluded that the Alternative #4 fix (mitigation) in Vol. 3 of NUREG-0460 is not the correct solution to ATWS. The industry believes that the alternative #2 fix (Prevention - Electrical Portion of RPS) is the appropriate ATWS solution.

3) Industry recognizes the TMI-2 impact on the role of the operator, his training aids and other lessons learned from this event. The industry believes that there is no need to rush to resolve ATWS because of the low probability of ATWS and because some of the anticipated changes to plants as a result of TMI-2 accident review would direct resources to other issues.

Following the AIF presentation, the staff raised their concerns that the ATWS resolution (not yet achieved) has been anything but hasty, that the NUREG documents on ATWS have been out for sufficiently long time period, that protection from ATWS is necessary, that TMI-2 event has raised concerns with the analyses assumptions and therefore the staff needs industry technical assessment of the TMI-2 impact on ATWS. The staff suggested that the TMI-2 event indicates a need to answer at least the following specific questions.

1) Analyses indicate the sensitivity of peak pressure to AFWS design and actuation time for some plants.

   Why should auxiliary feedwater actuation not be delayed beyond technical specification values? What bases are available to assume AFWS actuation earlier than the technical specification value? How do the analyses take into consideration the limits on AFWS injection rate due to water hammer considerations? How is the impact of flow restrictors on some AFWS designs considered in the ATWS analyses? How are the significant plant specific features of AFWS treated in the analyses?

2) As in question 1 above how are the differences in ECCS designs evaluated? For example, for some ATWS events, the pressure and the pressurizer level remain high enough such that either the HPSI cannot be actuated (because of shut off head considerations) or the operator may fail to actuate HPSI because of insufficient available information.

3) Would single failure cause all PORVs to fail to open? If so, then analyses must be based on all PORVs failing to open. Further, several plants are operating today with PORVs isolated. For these plants credit cannot be taken for relieving capability of these valves.

4) What assurance do we have that the ATWS events with a stuck open safety valve have been correctly analyzed? What is the potential for core uncovering under this scenario? What is the importance of ECCS actuation, reactor coolant pumps operation, and the pressurizer safety/relief valve discharge model on the potential for uncovering of the core? Further, why should more valves not be assumed to stick open following discharge of subcooled water.

5) For long term shutdown, discuss the following:

   a) available equipment, instrumentation and their qualification. (Must consider the effect of water discharged to the containment via ruptured quench tank).

   b) impact of loss of offsite power

   c) continued operation of reactor coolant pumps. Also consider tripping of reactor coolant pumps.

   d) Describe natural circulation, including effects of non-condensables. Is reflux boiling mode of operation anticipated? If so, justify.

e) Would one anticipate Boron precipitation problem? Also consider TMI-2 type problems with possible letdown line plugging from Boron precipitation.

f) How are leakage problems from equipment outside containment considered?

6) Why should credit be given for operator action even after ten minutes following an ATWS event initiation? TMI-2 experience does not provide enough confidence in the ability of the operator to perform correct actions only in this short time period under high stress conditions.

In response to the staff concerns the industry made the following comments.

AIF

1) The industry is frustrated because the staff concerns imply consideration of multiple failures and small LOCA which are beyond the credible events to be considered under ATWS. (Note - safety valve stuck open (small LOCA) is considered an anticipated transient).

2) Industry would like to wait for approximately six months before considering ATWS evaluations to minimize duplicate expenditures.

W

1) W has submitted responses to the 2/15/79 Mattson letter.

2) Calculated peak pressure of 2800 ~ 2900 psi (for Alt. #3) and proposed modifications in turbine trip and auxiliary feedwater system actuation circuitry.

3) EPRI expects to issue a request for proposal to conduct tests on PORVs and safety valves and some results should be available by end of CY 79.

4) Recommended that "Early Verification" approach should be continued.

CE - Ed Shearer speaking for himself

1) TMI raises few questions like the behavior of S/R valves and the operator action. Further, prevention is better than mitigation and that mitigation would mean more and more analyses.

2) Continue with early verification.

B&W

1) Basically agrees with the staff concerns. Industry has longer list of items that could impact ATWS.

2) Stress analyses should be completed.

3) Likelihood of additional failures beyond ATWS should be considered.

4) Prevention is better than mitigation.

B&W Owners Group

1) ATWS is not a safety problem.

2) Even if ATWS occurs, no significant risk to public health and safety.

3) TMI-2 suggests a desirability for realistic analyses. TMI-2 suggests a need to assure that analyses bound the facilities.

4) Wait until "Lessons Learned" and "Bulletins and Orders" issues are resolved before pushing ahead with ATWS.

After the above industry comments, the staff made the following concluding remarks.

1) We don't intend to go too fast on ATWS.

2) If Early Verification is to be pursued then there is a need to assure that earlier ATWS analyses are correct and review the industry TMI-2 related list. In this regard the industry was invited to meet with the staff to discuss the technical issues which impact ATWS. The staff asked the industry to provide their assessment of TMI-2 impact on ATWS, the scope of effort to resolve these issues, and the schedule for performing this effort within 30 days.

3) We cannot wait another year to make progress in ATWS.

The list of attendees is in the enclosure.

/s/

A. Thadani

Enclosure:
As stated

cc: See next page

ENCLOSURE

ATWS Meeting with Vendors & AIF

July 25, 1979

| | |
|---|---|
| Ashok Thadani | NRC/DSS |
| Arthur McBride | B&W |
| Alan Hosler | WPPSS |
| Samir K. Sarkar | FP&L |
| Alan E. Ladieu | YAEC |
| Fred T. Stetson | AIF |
| Richard G. Rateick | DECO |
| Andrew J. Rushnok | OEC |
| M. Srinivasan | NRC/DSS |
| F. Akstulewicz | NRC/DSE |
| G. Sorensen | WPPSS/AIF |
| T. Speis | NRC/DSS |
| F. C. Cherny | NRC/DSS |
| J. A. Norberg | NRC/OSD |
| Stuart Thickman | TVA - EN DES |
| Karl O. Layer | BBR |
| J. Ted Enos | AP&L |
| Ted Myers | TECo |
| Robert Dieterick | SMUD |
| Michael J. Salerno | CPCo |
| S. Hardy Duerson | B&W |
| Bob Steither | W |
| Gary Augustine | W |
| P. M. Abraham | Duke Power |
| Mark Wisenburg | USTVA - Office of Power |
| Michael Tokar | NRC/DSS |
| Paul Boehnert | NRC/ACRS |
| David Bessette | NRC/ACRS |
| Steven Traisman | Pacific Gas & Electric |
| Sam Miranda | W |
| Pat Loftus | W |
| Fred Mosby | Wyle Laboratory |
| Roger Newton | Wisconsin Electric Power |
| Craig Grochmal | Stone & Webster |
| Charles A. Daverid | Long Island Lighting Co. |
| Robert L. Stright | SNUPPS |
| Joseph M. Weiss | GE |
| Joseph A. Gonyeau | Northern States Power |

| | |
|---|---|
| Seth M. Coplan | NRC/DSE |
| Clayton L. Pittiglio | NRC/DSE |
| Kulin D. Desai | NRC/DSS |
| Fuat Odar | NRC/DSS |
| Kris Parczewski | NRC/DOR |
| Roy Woods | NRC/DOR |
| Harold Vander Molen | NRC/DOR |
| Gururajarao Rangarao | PASNY |
| Frank McPhatter | B&W |
| Steve Banwarth | B&W |
| William R. Murray | Virginia Electric & Power Co. |
| Ben Rodell | VEPCO |
| Don Swanson | PGE Co. |
| Paul V. Holton | Bechtel |
| Tommy Errington | Mississippi Power & Light |
| Ron Clauson | Florida Power Corporation |
| Charles B. Brinkman | CE |
| C. L. Kling | CE |
| William Benjamin | Commonwealth Edison Co. |
| Denny Kreps | CE |
| William E. Burchill | CE |
| A. E. Scherer | CE |
| Richard C. L. Olson | Baltimore Gas & Electric Co. |

ENCLOSURE 2

Letter from R. H. Bucholz (GE) to S. Hanauer, "ATWS Generic Analyses - Content of December 1979 Submittal", dated September 5, 1979.

Letter from J. H. Taylor (B&W) to S. Hanauer, "B&W Commitments for ATWS", dated September 13, 1979.

Letter A. E. Scherer (CE) to S. Hanauer, "NRC Request for Generic ATWS Information", dated August 31, 1979.

Letter L. O. DelGeorge (BWR 3 Owners representative) to S. Hanauer, "ATWS BWR/3 Plants and Vermont Yankee - Generic Analysis Supplement", dated August 28, 1979.

Letter T. M. Anderson (W) to S. Hanauer, "ATWS", dated August 24, 1979.